THE RELATIONSHIP BETWEEN TECHNOLOGICAL CAPABILITY AND INNOVATIVE SMES

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DEDICATION

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ABSTRACT

Rapid changes in market condition, seen small and medium enterprises (SMEs) give major impact to Malaysian economy because it has provided a great contribution to the economy. Despite the importance of SMEs and the existence of government support from the various ministries and agencies, most literature indicated that SMEs are still having a lot of challenges that hinder their development. This research suggests the embracing of technological capability as an approach to enhance SMEs competitiveness. The objectives of this research are to identify the practices of technological capabilities among innovative SMEs in Malaysia and to investigate the relationship between technological capability and entrepreneurial orientation. The research adapted survey research design using questionnaire to obtain the quantitative data and simple random sampling was used to select the respondents. There are 51 respondents with 86% of response rate companies which are Malaysian innovative SMEs and listed under MTDC incubator programme. The data was analysed using IBM SPSS Software. Descriptive analysis, correlation and regression analytical techniques were used in analysing the research data. The findings indicated that the average mean score for the parameters of technological capability is at high level. This indicates that innovative SMEs that participated in this research have successfully practiced technological capability in their organization. The result of the hypothesis testing show an inter-item correlation that depicts positive correlation with significant relationship between innovation capability and investment capability to entrepreneurial orientation. However, there are no correlation exists between production capability with entrepreneurial orientation. This result indicate that SME entrepreneurs should understand and be aware of the importance of both organizational context and behavioural complexity in developing firm related capabilities in order to achieve the desired level of manufacturing flexibility thus boost their production more efficiently and effectively. Overall, firms need to perform an internal strategic and coherent strategy commensurate with the expected environment to get better performance.

ABSTRAK

Perubahan pesat pada keadaan pasaran, melihat perusahaan kecil dan sederhana (PKS) memberi impak besar kepada ekonomi Malaysia kerana ia memberikan sumbangan besar terhadap ekonomi. Walaupun terdapat kepentingan PKS dan kewujudan sokongan kerajaan dari pelbagai kementerian dan agensi, kebanyakan kajian menunjukkan bahawa PKS masih menghadapi pelbagai cabaran yang menghalang perkembangan mereka. Kajian ini mencadangkan keupayaan teknologi sebagai satu pendekatan untuk meningkatkan daya saing PKS. Objektif penyelidikan ini adalah untuk mengenalpasti amalan keupayaan teknologi di kalangan PKS inovatif di Malaysia dan untuk mengkaji hubungan antara keupayaan teknologi dan orientasi keusahawanan. Kajian ini menggunakan reka bentuk kajian tinjauan menggunakan soal selidik untuk mendapatkan data kuantitatif dan pensampelan rawak mudah untuk memilih responden. Terdapat 51 responden dengan 86% kadar tindak balas daripada syarikat PKS inovatif di Malaysia dan disenaraikan di bawah program inkubator MTDC. Data dianalisis dengan menggunakan Perisian IBM SPSS. Analisis deskriptif, analisis korelasi dan regresi digunakan dalam menganalisis data penyelidikan ini. Hasil kajian menunjukkan bahawa purata min skor untuk parameter keupayaan teknologi adalah pada tahap yang tinggi. Ini menunjukkan bahawa PKS inovatif yang mengambil bahagian dalam penyelidikan ini telah berjaya mengamalkan keupayaan teknologi dalam organisasi mereka. Hasil ujian hipotesis menunjukkan korelasi antara item menggambarkan korelasi positif hubungan yang signifikan antara keupayaan inovasi dan keupayaan pelaburan terhadap orientasi keusahawanan. Walau bagaimanapun, tidak ada hubungan yang wujud antara keupayaan pengeluaran terhadap orientasi keusahawanan. Keputusan ini menunjukkan bahawa usahawan PKS perlu memahami dan menyedari kepentingan konteks organisasi dan kerumitan tingkah laku dalam membangunkan keupayaan firma untuk mencapai tahap pembuatan yang diinginkan seterusnya meningkatkan pengeluaran mereka dengan lebih cekap dan berkesan. Secara keseluruhannya, firma perlu melaksanakan strategi dalaman dan koheren bersesuaian dengan persekitaran yang diharapkan untuk memperoleh prestasi yang lebih baik.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

Most of the industries had changed their nature of business because of the changes in the technology and social that derives from the revolution of information to globalization and knowledge-based economy. In addition, there are also changes among the users perspective where they are now more likely to buy a user-friendly products, fast delivery, products with advance technology, good quality products, and service based on value (Fonseka, Tian, & Li, 2014). These changes encourage firms to use existing resources more wisely and to avoid wastage thus creating a new environment for the firm.

Competitiveness of firms has its own characteristics namely special assets and resources, valuable, cannot be replaced or duplicated, and heterogeneous (Wei & Olufemi, 2011). Consequently, firm position will be protected in terms of a great strategy and technology management (Guan *et al.,* 2006). Raisch and Vonkrogh (2007) point out that firm's ability to obtain competitive growth compared to other competitors those who are run the same business in that industry known as competitive growth rate.

1.1 Background of the research

Rapid changes in market condition, seen small and medium enterprises (SMEs) give major impact to Malaysian economy because it has provided a great contribution to the economy. The contribution of SMEs to the economy are creating jobs, generating income, generating export activities, increasing competition for the more advanced and innovative firm, providing training to the needy and encourage more entrepreneurs involve in business (Zakaria, 2011).

SMEs are unable to compete with multinational companies based on price due to limited financial resources. Conversely, on the basis of the corporate policy, larger firms often find it is very difficult to react to current trends in the market (Tasmin *et al.*, 2013). Therefore, SMEs need to take advantage on the weaknesses of multinational companies by quickly adapt better strategies to the specific needs of the market and a high level of commitment. This strategy is considered important to build a good relationship with their customers and gain a competitive advantage compared with others larger companies.

Sobanke *et al.,* (2013) point out that the companies may have a competitive advantage in their industry with important strategic resources of technological capabilities. Excellent technological capabilities can also guarantee advantages in efficiency of the innovation process that accelerates the development of new products as well as higher product diversity that will respond to the environment of changing market (Shu-en & Ming, 2007). Moreover, acknowledgement of technological capability and its level can helps the firm to identify its strengths and weaknesses, assist in designing technological innovation strategy and improve competitive advantage (Son, 2014). This advantage is particularly important to innovative SMEs, namely as the users of technology that will enable them to compete at a higher level. Thus, more values will create by the company and achieve higher profit than other competitors within their industry.

Other than that, innovation management studies normally focus on small high-tech companies, process of innovation and development of new product (Laforet & Tann, 2006). The government of Malaysia had also developed different strategies in order to stimulate innovation in high-tech industry, as the innovation is significant for innovative

companies (Naqshbandi & Kaur, 2015). In Malaysia, incubators are used as a part of a strategy to achieve rapid economic growth, that is, to achieve its long-term vision of transforming the country from an underdeveloped to a developed state. Technology incubators are one of the important elements required to produce technopreneurs (Said, Adham, & Abdullah, 2012). Therefore, the government agencies implemented technology incubator programmes that served as a medium for technopreneurs to increase the number of technology-based SMEs in Malaysia. One of the government agencies is Malaysian Technology Development Corporation (MTDC), a company wholly-owned by Khazanah Nasional Malaysia. Khazanah Nasional Berhad is the strategic investment fund of Malaysia Government. MTDC has established Technology Development Centers to facilitate university-research-business collaboration at Universiti Putra Malaysia (MTDC-UPM), Universiti Teknologi Malaysia (MTDC-UTM), Universiti Kebangsaan Malaysia (MTDC-UKM), Universiti Teknologi MARA (MTDC-UITM), and lastly Forest Research Institute Malaysia (MTDC-FRIM). In general, government sponsored incubators in Malaysia offers several added-value programmes such as entrepreneurial training. Young technopreneurs in Malaysia are lack of capital and basic business knowledge experience required to plan and build business operations around the technology concept they wish to develop. This is where entrepreneurial training comes handy. The trainings provided include preparation of business plan, basic company management and looking for financing.

Moreover, entrepreneurship scholars have attempted to use intangible resources that firms maintain to explain innovative performance by investigating entrepreneurial orientation (EO) (Getz & Petersen, 2005). In this research, innovative SMEs which focus on EO is used as firms' orientation and proclivity to explore new opportunities and manifests itself through a firm's tendency to accept innovativeness, risk-taking, and proactiveness (Lumpkin & Dess, 1996). In conclusion, competitiveness of innovative SMEs can be improved by identifying the practices of technological capability and entrepreneurial orientation in order to address the problems faced by them rather than only understanding their business problems. Hence, innovative SMEs should take another

initiative as a step to explore and utilize their strengths and also overcomes all the weaknesses they have.

1.2 Problem statement

There are a lot of efforts in terms of government infrastructures, incentives and policies in order to support the development of Malaysian SMEs (Abdullah & Shamsuddin, 2009). For example, government had set up various programmes in line with the objectives to support the development of SMEs through various ministries and agencies that consists of both government and private sectors (Yusoff, Yaacob, & Ibrahim, 2010).

Despite the importance of Malaysian SMEs and the existence of government support from the various ministries and agencies, most literature indicated that Malaysian SMEs are still having a lot of challenges that hinder their development and the failure rate is getting higher (Yusoff & Yaacob, 2010). This is due to the problems faced by Malaysian SMEs such as experiencing competitive challenges. The competitive challenges made up from limited capability to fulfill the market liberalization and globalization challenges, robust global competition, restricted accessibility to capital and financing, knowledge acquisition and technology management has a limited capacity, inadequate of information and knowledge resources, vigorous competition among producers, infrastructure with high cost, does not perform well in human capability, less of employees with managerial skills, less of talented employees, lack of skills for the new start-up company and less quality of output and low productivity (Doh & Kim, 2014; Hasnan *et al.,* 2014; Hilmi *et al.,* 2010; Poorangi *et al.,* 2011; Rahman & Ramli 2014; Zain *et al.,* 2012).

The main reason for the SME closure is due to the fact that SME owners are not aware of the business challenges, especially in terms of financial and management skills. The funds provided by the government or any other sources are used without proper records and future plans. Other than financial constraints, SMEs experience a lack of managerial skills, marketing issues, product/service innovation, knowledge management and internationalization (Rahman, Yaacob & Radzi, 2016).

Furthermore, innovation had been considered as the main key to success for a firm to sustain their competitive advantage (Bigliardi, Colacino, & Dormio, 2011; Rhee, Park, & Lee, 2010). According to Laforet and Tann (2006), small business are an important driving force for innovation activities and are able to become innovative as the larger companies. Innovative SMEs are firms that use the technology to produce new products, new processes and services, in order to achieve competitive advantage (Arshad *et al.*, 2014). In the same way, based on SME Corporation (2012), SME Masterplan 2012-2020 has proposed new targeted approach to promote innovative and align SME development to the broader national aspirations of achieving a high income economy by 2020 through innovation-led and productivity-driven growth. This plan aims to increase business formation, expand number of high growth and innovative firms, raise productivity and intensify formalization.

Normally, innovative SMEs utilize their own internal resources to explore competitive advantage (Qi, Yang, & Xiao, 2007). Competitive advantage, particularly in high-tech industries can be achieved within their industry by using an important strategic resource which is firms' technological capability (Duysters & Hagedoorn, 2000). Technological capability is based on the accumulated knowledge of a firm's ability to perform a set of activities that enable the development of new technologies to achieve positive economic results (Reichert & Zawislak, 2014). Hence, innovative SMEs must focus on their technological capability in order to improve its productivity, competitiveness and economic growth. Moreover, past studies had shown that technological capability is an important determinant that can enhance competitiveness and improve firm performance directly or indirectly (Kuen-Hung Tsai, 2004; Lee, Lee, & Pennings, 2001; Shu-en & Ming, 2007). With the increasing importance of entrepreneurial orientation in innovative SMEs, researchers have examined the practices of technological capability impact to the firms' entrepreneurial orientation.

In summary, this study adds the complementary analysis of competitive strategy and resource-based view perspectives to the study of the relationship between technological capabilities and entrepreneurial orientation. Despite, from the previous studies only analyze the direct effect of technological capabilities on firm performance.

This research attempts to fill the gaps in the literature as there are relatively no identified studies on technological capability relationship with entrepreneurial orientation. History shows that innovation is key to survival. With the advent of a knowledge-based economy, technological capabilities are recognized as the driver of industry performance and economic growth. A conceptual model is then proposed in the following chapter to address the above gaps. The model may help innovative SMEs to achieve higher impacts on their businesses from the utilization of technological capability and may also provide a strategic roadmap for other SMEs. Meanwhile, firms with high levels of entrepreneurial-oriented processes are proficient in creating new organizational forms and environment configurations and are capable of shaping market arrangements to their advantage.

1.3 Research questions

Research questions are used to form a basis in deciding the direction and focus of this research. The research questions are as the following:

i. What is the practices of technological capabilities among innovative SMEs in Malaysia?
ii. What are the relationship between technological capability and innovative SMEs in Malaysia?

1.4 Aim and objectives of the research

The aim of this research is to identify the practices of technological capability among innovative SMEs industries in Malaysia. Based on the research background and other related issues, the objectives of this research are as follows:

i. To identify the practices of technological capabilities among innovative SMEs in Malaysia.
ii. To investigate the relationship between technological capabilities and innovative SMEs in Malaysia.

1.5 Scope of the research

This research is focused on innovative SMEs or technology-based SMEs. Whilst, the sample for this research comprises an innovative SMEs which are list under MTDC incubator programme. The list of the companies is gathered from Malaysian Technology Development Corporation (MTDC), a company wholly-owned by Khazanah Nasional Malaysia. Khazanah Nasional Berhad is the strategic investment fund of Malaysia Government. The targeted respondents were general managers or core members of the managerial team or assigned persons by general manager who have good understanding of the firm.

The rational choice of this respondents because of the role of MTDC; overseeing the technology-based companies' development, as the key player in commercialization and promoting technology-based companies which is as innovative SMEs. MTDC provide fund management, incubation, advisory, and nurturing services. In addition, it is also relates to the graduation policy of the incubator programme laid down by the MTDC. For example, a company can only be said to have graduated from the Technology Center Program if MTDC have found that the company had complied with two or more of the conditions that have been set. Other than that, technology incubators boasts an excellent opportunity for technology startups to collaborate and network with other like-minded entrepreneurs by providing an affordable location. The five centres of incubators located at Universiti Putra Malaysia (MTDC-UPM), Universiti Teknologi Malaysia (MTDC-UTM), Universiti Kebangsaan Malaysia (MTDC-UKM), Universiti Teknologi MARA (MTDC-UITM), and lastly Forest Research Institute Malaysia (MTDC-FRIM).These five centres facilitate cross-sharing of knowledge and experience with companies and researchers alike, enabling industry and academia to leverage on each other's strength whilst accelerating commercialization activities.

1.6 Significant of the study

This study hopes that SMEs can improve their understanding on technological capability. This study also can help innovative SMEs in managing and designing organizational strategies using technological capabilities. In addition, technological capabilities of innovative SMEs can boost their production more efficiently and effectively.

Other than that, this study can also help other researchers to determine the practices of technological capabilities of the innovative firm. This will also help other researchers to obtain information related to technological capabilities and unique features of firms in the selected innovative SMEs.

1.7 Organization of the thesis

This research consists of five chapters. The writing organization explains the transition of research progress according to chapters. *Chapter 1* is for introduction. In this chapter, the background of research title is elaborated and discussed. As the understanding of research background is cleared, the problem statement is identified from the gaps that exist in the research background, research questions are formulated and relevant research objectives are presented. Lastly, the scope of research and significant of research is discussed.

Chapter 2 reviews the aspect of technological capability (TC) so that it can give a clear knowledge of relevant research regarding this research topic. It consists of the understanding of TC, previous work on the parameters of technological capability, the background of Malaysian SMEs and the drivers of innovative SMEs. Next, the RBV theory is used and a conceptual framework is then proposed in this chapter to address the research gaps. The discussion on the relationship between each variable also discussed in this chapter.

Chapter 3 discusses the methodology and the techniques that had been used to accomplish the aim of this research and the research objectives. This chapter include philosophy of research, research design, research population and sampling, research instruments, data collection and the process of data analysis. The quantitative approach

was adopted to carry out the research. A questionnaire is the research instrument that help researcher to obtain the data. Then, the pilot test analysis examined the content of the questionnaire so that the correction can be made before the actual research is carried out. The data were analyzed using IBM SPSS Software. In short, in order to conduct an academic research, the methodology must be comprehended so that the data obtained are reliable and valid.

Chapter 4 describes data analysis and discussion. The data collected from the survey will be used to answer the two research objectives. In order to do so, there are several analyses to be done by using IBM SPSS software such as descriptive analysis, correlation analysis and regression analysis. The data had been collected by distributed the questionnaires to the innovative SMEs under MTDC incubator programme. Thus, research findings and result will be discuss further and will have short summary at the end of the discussion.

Chapter 5 explains the conclusion and recommendations. The main conclusion is drawn out in this chapter and the limitations that encountered during the whole process of collecting data. This chapter also shows the research objectives achievement; and offers conclusions with regard to the research outcomes based on the respective research questions and the contributions to the body of knowledge. Finally, recommendations for future research are proposed.

CHAPTER 2

TECHNOLOGICAL CAPABILITY AND INNOVATIVE SMEs

2.1 Introduction

This chapter reviews some of the earlier work on the application of firm's technological capability in some industries. It focuses on the understanding of technological capability, the definitions, importance of technological capability and also the parameters to measure technological capability. All the categories of the technological capability will lead to the development of an instrument for measuring technological capability in Malaysian innovative SMEs. This chapter also defines and explains the definition and the background of Malaysian SME and innovative SMEs.

2.2 Technological capability

Technological capability changed over the year because it was a dynamic or not static entity (Cobbenhagen, 2000). It is important to find out the laws of technological capabilities as it is the basis to the effective management of technological innovation (Xianjun, Ke, & Li, 2009). The evolution and development of technological capability is associated with the input and transformation of capital, human resources, equipment, and information (Vertova, 2001).

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